

Figure 19-1 Efficiencies of engines

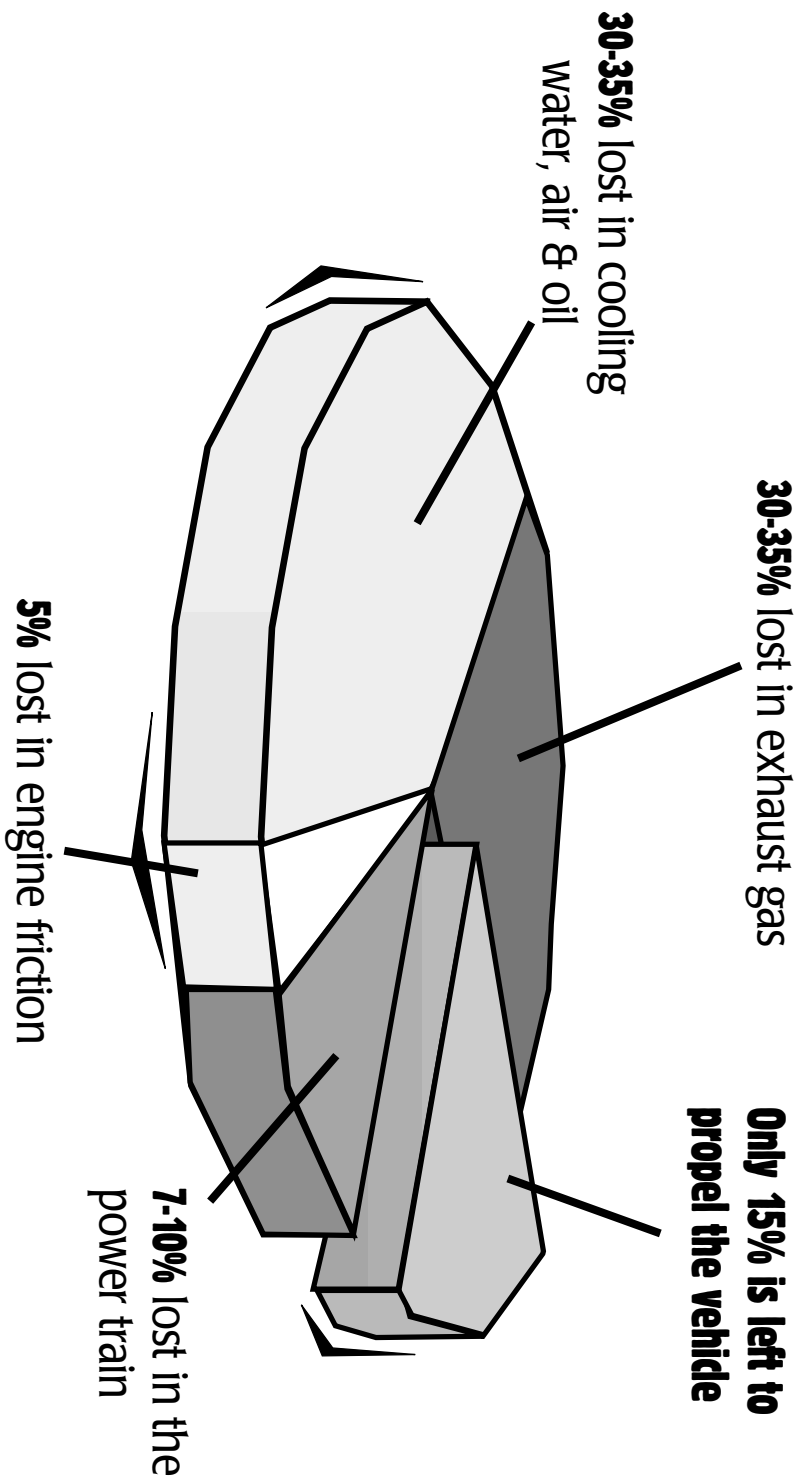
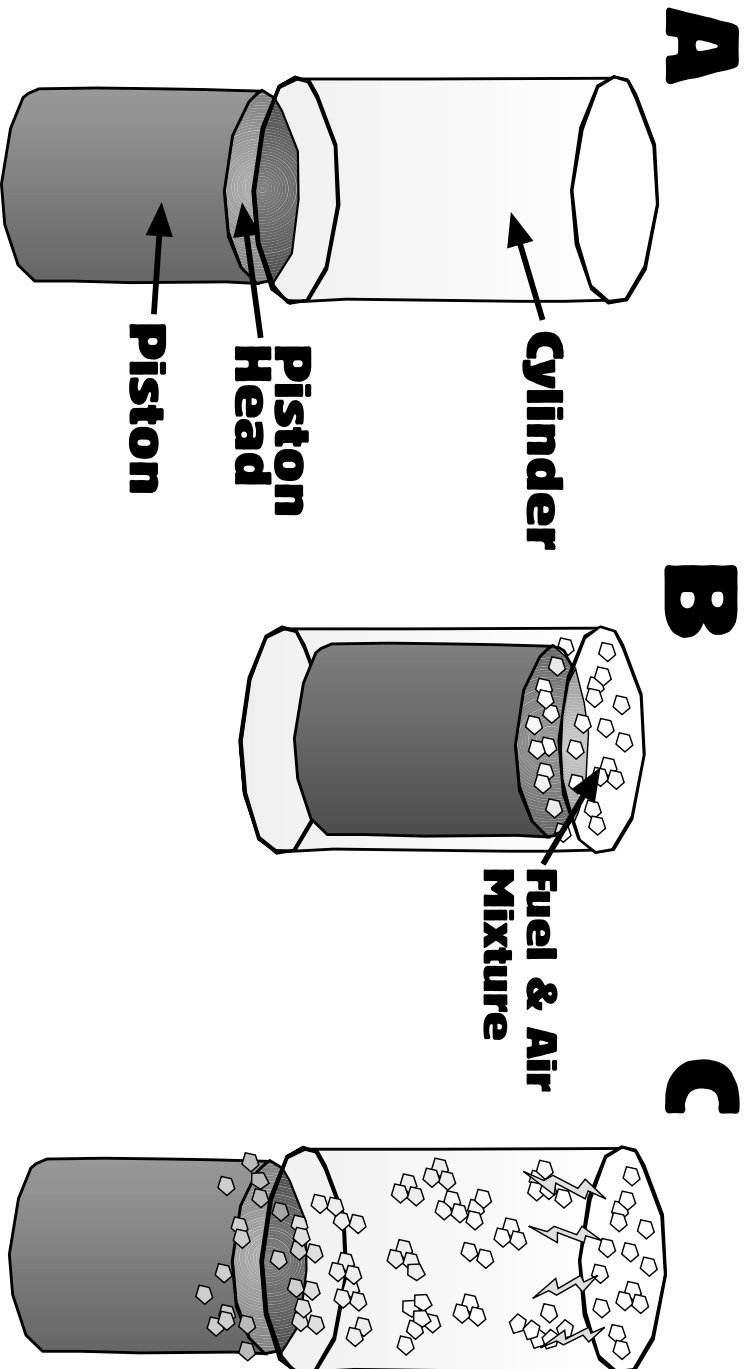


Fig. 3-1-2 Energy loss in a vehicle, p. 229



- a) The piston is a metal plug that fits snugly into the cylinder.
- b) When the piston is pushed up into the cylinder, the fuel/air mixture is trapped and compressed.
(The cylinder is drawn as though it were transparent, so the action can be seen.)
- c) The increase in pressure, as the mixture of air and gasoline ignites, pushes the piston down in the cylinder.

Fig. 3-2-3 Three views showing the action in an engine cylinder, p. 246

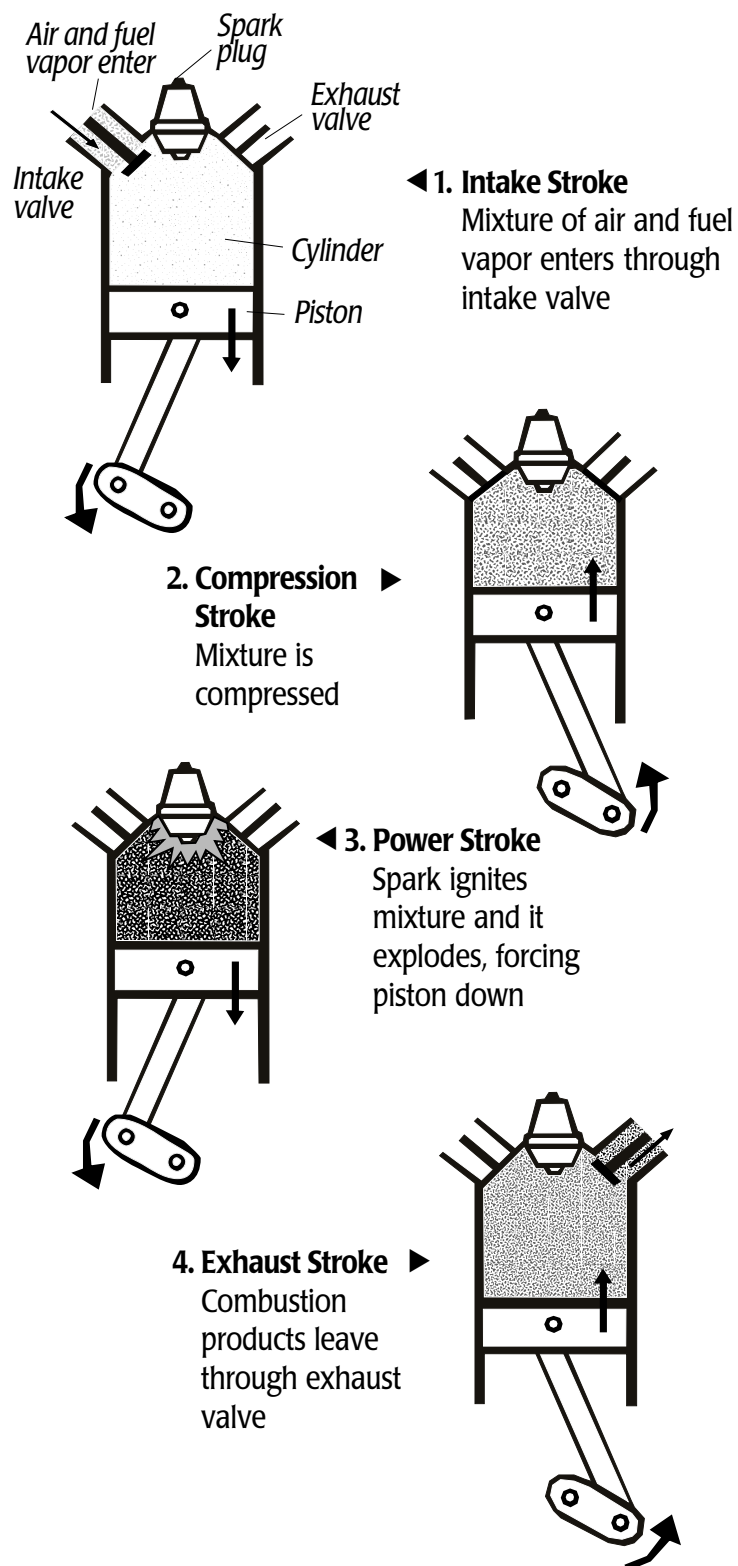


Fig. 3-2-5 The four strokes of an Otto-cycle engine, p. 248

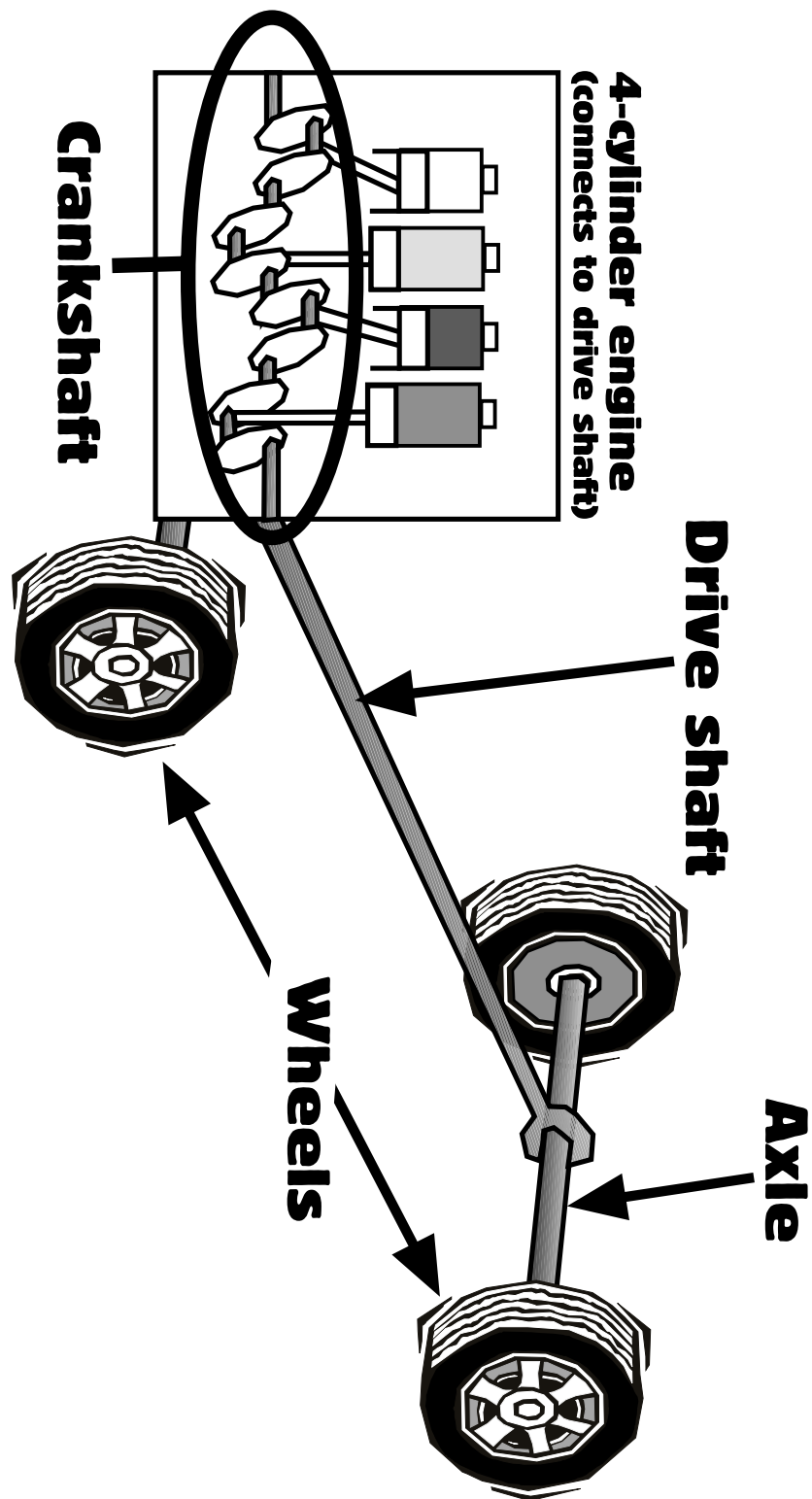


Fig. 3-2-6 A four-cylinder engine connected to a crankshaft, p. 249

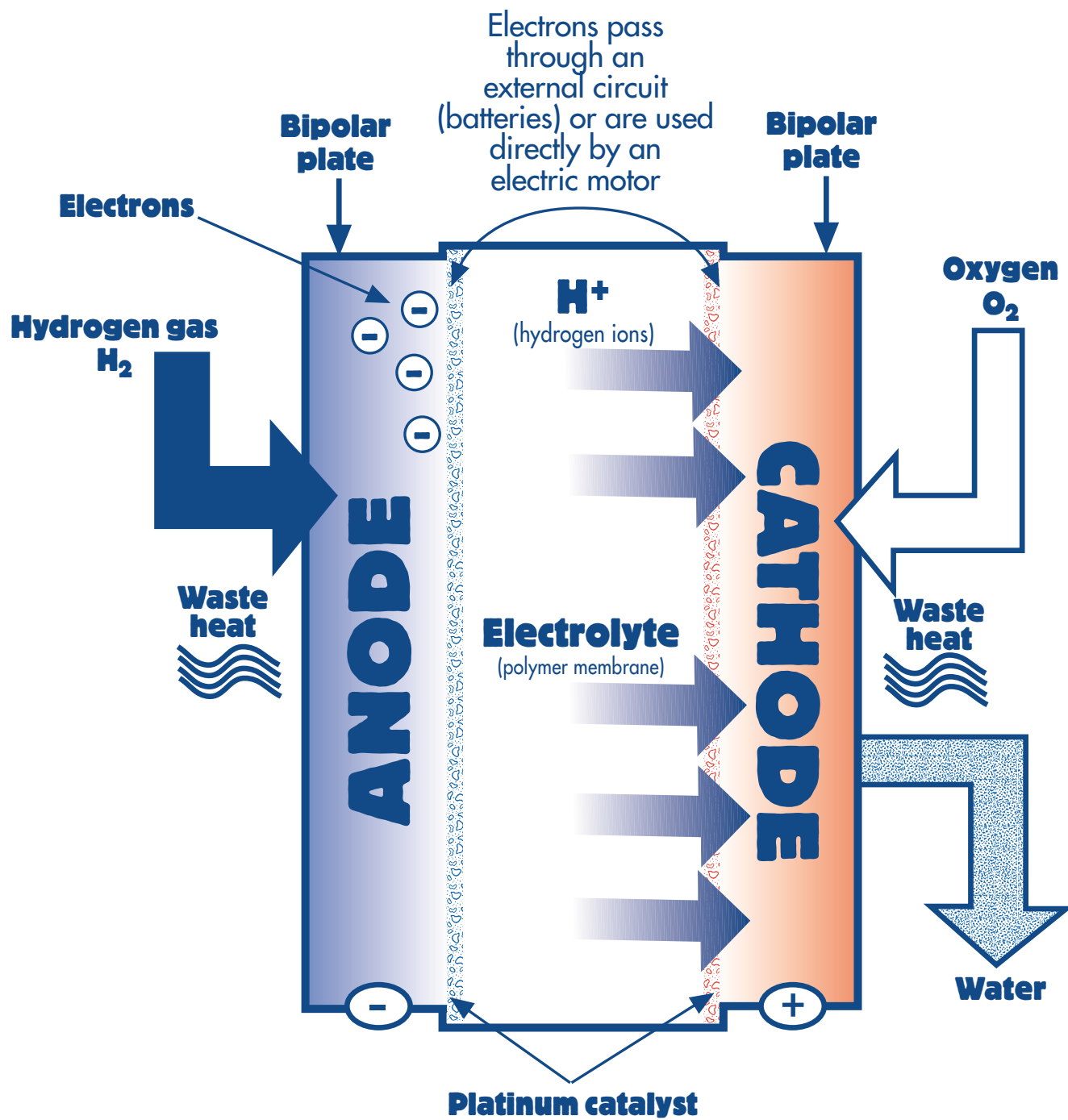
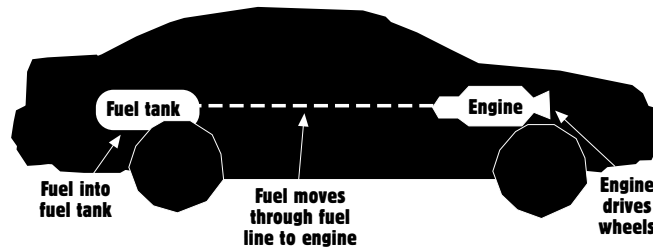


Fig. 3-3-2 Proton exchange membrane fuel cell, p. 261

Internal-combustion engine vehicles

Fuels

Alcohol fuels
Biodiesel
Gasoline
Hydrogen
Natural gas
Propane

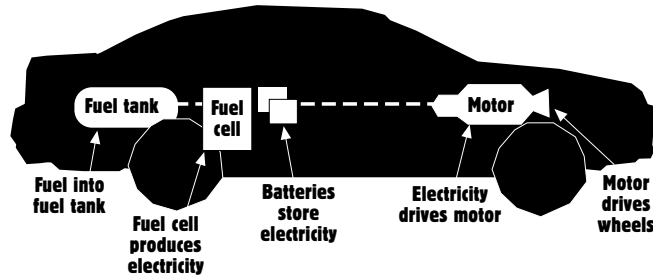


In an engine, fuel is burned in cylinders and is ignited either by compression (diesel engine) or a spark (gasoline-type engine)

Fuel-cell vehicles

Fuels

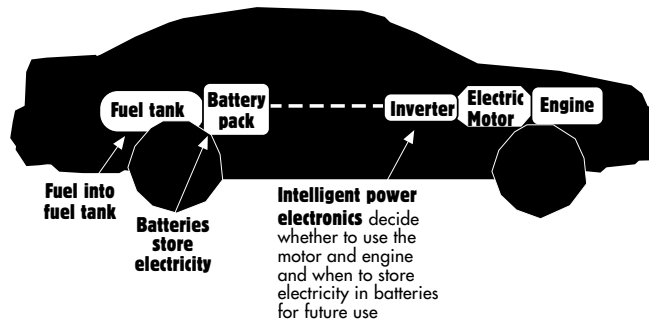
Alcohol fuels
Gasoline
Hydrogen
Natural gas
Other fuels are under development



Hybrid/electric vehicles

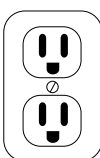
Fuels

Electricity
Gasoline



Electric vehicles

Fuels



Electricity

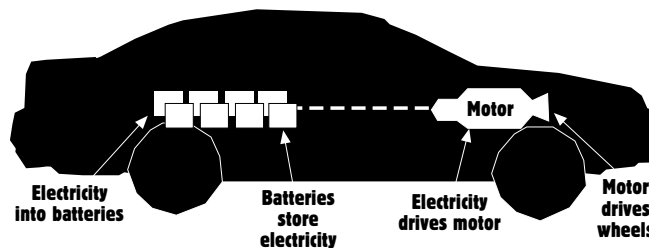


Fig. 3-3-4 Four vehicle comparisons, pp. 263-264